REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-31 are pending in the present application. Claims 1, 12, and 23 are amended by the present amendment.

In the outstanding Office Action, Claims 23-28, 30, and 31 were rejected under 35 U.S.C. §102(b) as anticipated by Kasai (U.S. Patent 6,246,705); Claims 1-5 and 7 were rejected under 35 U.S.C. §102(b) as anticipated by Ema et al. (U.S. Patent 5,946,334, herein "Ema"); Claims 1, 2, 16, and 18 were rejected under 35 U.S.C. §102(b) as anticipated by Hironari (Japanese Patent Application No. JPH11-105336); Claims 1-4, 6, 9, 15-17, 20, and 21 were rejected under 35 U.S.C. §102(b) as anticipated by Thompson (U.S. Patent 5,444,728); Claim 29 was rejected under 35 U.S.C. §103(a) as unpatentable over Kasai in view of Kaminishi (U.S. Patent 6,618,406); Claims 8 and 22 were rejected under 35 U.S.C. §103(a) as unpatentable over Thompson in view of Kaminishi; Claims 10 and 11 were rejected under 35 U.S.C. §103(a) as unpatentable over Thompson in view of Trotter et al. (A CMOS Low Voltage High Performance Interface, Microsyst. Phototyping Lab., Mississippi State Univ., MS, USA, ASIC Conference and Exhibit, 1994, herein "Trotter"); and Claim 19 was rejected under 35 U.S.C. §103(a) as unpatentable over Thompson in view of Canright (Practical Design for Control Impedance, Orlando, Florida, USA, Electronic Components and Technology Conference, 1991, Proceedings 41st, 11-16 May 1991, pps. 370-377, Atlanta, GA).

The rejection of Claims 23-28, 30, and 31 under 35 U.S.C. §102(b) as anticipated by Kasai is respectfully traversed for the following reasons.

Briefly recapitulating, Claim 23 is directed to a laser modulating and driving device including, *inter alia*, a pixel data generating unit that produces pixel data and is formed in a

first block, a modulation signal generating unit that generates a low-voltage laser modulation signal from the pixel data and is formed in the first block together with the pixel data generating unit, and a driving unit configured to drive a laser according to the laser modulation signal supplied from the modulation signal generating unit and formed in a second block, spatially separate from the first block. Claim 30 recites similar features as Claim 23. In a non-limiting example, Figure 2 shows the modulation signal generating unit 120 formed in a separate block from the driving unit 170.

The claimed low-voltage laser modulation signal is suitable for high-speed transmission and thus, the claimed low-voltage laser modulation signal is transmitted at a high speed through a transmission line from the first block, in which the modulation signal generating unit is formed, to the second block, in which the driving unit is formed.

Turning to the applied art, Kasai discloses an optical scanning device in which PWM digital data is generated in a first block 20 (see column 5, lines 6-13), and the data is transmitted to a second block 10 through a common 8-bit data bus 31 as disclosed at column 5, lines 28-32. Then, PWM signals are generated by the PWM signal outputting circuit 13 in the second block 10, in which the driving circuit 11 is also provided. The PWM signal generated and output from the PWM signal outputting circuit 13 is an analog voltage signal as shown in Figure 5B in Kasai. Thus, the PWM signal outputting circuit 13 has to be provided in a ***same block*** as the driving circuit 11 in Kansai in order to avoid transmission losses.

The outstanding Office Action states that Kasai discloses in Figure 3 a PMW data outputting circuit 23 that corresponds to the claimed modulation signal generating unit. However, Applicants respectfully submit that the PWM data outputting circuit 23 of Kasai does not generate a signal but outputs data that is transmitted to the PWM signal outputting circuit 13 in Kasai in block circuit 10 to generate a signal.

Accordingly, it is respectfully submitted that independent Claims 23 and 30 and each of the claims depending therefrom patentably distinguish over Kasai.

Regarding the outstanding rejections on the merits of Claim 1, Claim 1 has been amended to more clearly recite that a modulation signal generating unit is provided in a first block and a driving unit is provided in a second block spatially separated from the first block. The claim amendments find support in Figure 2 and its corresponding description in the specification and also in original Claim 12, which was not rejected on the merits. No new matter has been added.

Briefly recapitulating, amended Claim 1 is directed to a laser modulating and driving device that includes a modulation signal generating unit provided in a first block and is configured to generate and output a laser modulation signal consisting of a pair of symmetrical small swing differential signals based on pixel data. The driving unit is provided in a second block, spatially separated from the first block, and is configured to drive a laser according to the laser modulation signal output and supplied from the modulation signal generating unit.

The claimed modulation signal consists of small swing (low voltage) differential signals, which are suitable for high-speed and long-range transmission because such small swing differential signals have low noise and low energy loss during propagation.

Turning to the applied art, Ema shows in Figure 1 a semiconductor laser 1 that is controlled by a current I_{LD} through a driving transistor 7. However, Figure 1 of Ema shows that both the laser 1 and the driving transistor 7 are formed on the same block and not on separate blocks as required by amended Claim 1.

Further, the outstanding Office Action asserts that Figure 10 of Ema shows a light emission instruction signal generating unit 112 and a driving unit that supplies a signal I_{LD}.

Initially, it is not clear if the outstanding Office Action combines Figure 1, which is the background art of Ema, with the embodiment shown in Figures 10 and 11 of Ema, which is different from the background art shown in Figure 1 because Figures 10 and 11 do not show a signal I_{LD} as asserted by the outstanding Office Action. If that is the situation, then the present § 102 rejection is improper. Assuming that the present rejection is a §103 rejection based on a combination of the background art of Ema with the embodiment disclosed in Figures 10 and 11, Applicants note that the light emission instruction signal generating unit 112 and the amplifier 108 are not provided in blocks spatially separated from each other as required by amended Claim 1.

Further, it is not clear whether the amplifier 108 of Figure 10 is asserted by the outstanding Office Action to correspond to the claimed driving unit. It is noted that the outstanding Office Action states that Ema discloses a driving unit but does not identify any unit in Ema that corresponds to the driving unit.

Because Claim 1 is directed to two different units that are spatially separated from each other, it is believed that the next Office Action should clearly identify specific units of Ema that correspond to the claimed units so that a determination of whether those units in Ema are spatially separated from each other can be made.

In addition, Applicants note that Figures 10 and 11 of Ema are schematical diagrams and therefore, those figures do not show whether a unit is spatially separated from another unit.

Accordingly, it is respectfully submitted that amended Claim 1 and each of the claims depending therefrom patentably distinguish over Ema.

Hironari shows a semiconductor integrated circuit that has a laser driving current that corresponds to an output signal of a pixel modulation circuit. Hironari shows in Figure 1 the

pixel modulation circuit 1 that output signals to a connection circuit 3, which transmits the signals to a laser driving circuit 2.

However, Hironari discloses fill-swing differential signals, which are disadvantageous because of the large power requirement for transmitting the signals from the pixel modulation circuit 1 to the driving circuit 2 due to the high noise operation and bad EMJ.

Thus, Hironari does not teach or suggest a laser modulation signal consisting of a pair of symmetrical small swing differential signals as required by Claim 1. Therefore, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Hironiri.

Thompson shows in Figure 7 a laser driving circuit having a switch driver 32, asserted by the outstanding Office Action to correspond to the claimed modulation signal generating unit, and a bypass switch 30, asserted by the outstanding Office Action to correspond to the claimed driving unit. However, it is noted that the switch driver 32 and the bypass switch 30 are not provided in blocks spatially separated from each other as required by amended Claim 1.

Accordingly, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Thompson.

The remaining applied art has been considered but none of the references cures the deficiencies of Kasai and Thompson discussed above. Accordingly, it is respectfully submitted that the presented claims patentably distinguish over any combination of the applied art.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

James J. Kulbaski
Attorney of Record
Registration No. 34,648

Remus F. Fetea, Ph.D.
Registration No. 59,140

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)
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